

NATURAL RESOURCES CONSERVATION SERVICE CONSERVATION PRACTICE STANDARD

HERBACEOUS WIND BARRIERS

(Ft.)
Code 603

DEFINITION

Herbaceous vegetation established in rows or narrow strips across the prevailing wind direction.

PURPOSES

This practice may be applied as part of a resource management system to support one or more of the following:

- Reduce soil erosion and/or particulate generation from wind.
- Protect growing crops from damage by wind-borne soil particles.
- Manage snow to increase plant available moisture.
- Provide food and cover for wildlife.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to cropland or other land where crops are grown.

CRITERIA

General Criteria Applicable to all Purposes

Vegetation. Barriers may be composed of perennial or annual plants, growing or dead. Plant materials shall be selected for the following characteristics:

- Adaptation to local soil and climate conditions.
- Stiff, erect non-spreading growth habit.
- Resistant to lodging.
- Good leaf retention.
- Minimum competition with adjacent crops.

Number of rows. Barriers may consist of one row of plants, providing the required porosity can be achieved with a single row, and that the row contains no gaps. More than one row shall be planned for each barrier on sites, such as sandy soils, that negatively affect the establishment or survival of the barrier.

When two or more rows are required to achieve the required porosity and to avoid gaps, the rows shall be spaced no more than 36 inches apart. See Table 1.

Barrier Direction and Spacing. The effective spacing between barriers shall be determined using current approved wind erosion prediction technology. When barrier directions deviates from perpendicular to the prevailing wind erosion direction, the spacing between barriers shall be correspondingly reduced. (See table 502-3 of the National Agronomy Manual, 3rd Ed., June 2000, for adjustment factors).

Calculating Porosity. The number of rows of vegetation needed to achieve the required porosity listed in this standard shall be determined using the most current wind erosion technology. See Table 1.

Harvest. Harvest of hay or seed from perennial barriers, grazing, or mowing for weed control, shall be managed to allow regrowth to the planned height before periods when wind erosion, crop damage, or drifting snow are expected to occur. Annual barriers will be managed so barriers are of sufficient height and condition to meet their intended purpose.

Additional Criteria to Reduce Soil Erosion and/or Particulate Generation from Wind

Barrier Height. Barriers designed for this purpose shall have a minimum expected height of 1.5 feet during the wind erosion period for which the barriers are designed.

Barrier Porosity. Barriers established for this purpose shall be designed to achieve a porosity of 40-50 percent.

Barrier Direction and Spacing. The spacing between barriers shall be measured along the prevailing wind erosion direction during the critical wind erosion period(s) being planned for on the field. Spacing shall not exceed 10 times the expected height of the barrier plus additional width permitted by the soil loss tolerance (T), or other planned soil loss

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objective. Calculations shall account for the effects of other practices in the conservation system.

Additional Criteria to Protect Growing Crops from Damage from Wind-borne Soil Particles

Barrier Height. Barriers designed for this purpose shall have a minimum expected height of 0.5 feet during those periods when growing crops are susceptible to damage by blowing wind or wind-borne soil particles. **The designed height of the barrier will depend on the distance between the barrier and the crop being protected, and the crop height at which it will no longer need the protection of a barrier.**

Barrier Porosity. Barriers established for this purpose shall be designed to achieve a porosity of 40-50 percent during the period when growing crops are to be protected.

Barrier Direction and Spacing. The spacing between barriers shall be measured along the prevailing wind erosion direction during those periods when sensitive crops are susceptible to damage by wind-borne soil particles. Spacing shall not exceed 10 times the expected height of the barrier plus additional width permitted by the crop tolerance to damage from wind erosion* as specified in applicable Field Office Technical Guides, other accepted technical references, or other planned crop protection objective.

*Crop tolerance to damage from wind erosion is the maximum rate of soil blowing that a growing crop can tolerate, from crop emergence to field stabilization, without an economic loss to crop stand, crop yield or crop quality.

Calculations shall account for the effects of other practices in the resource management system.

Additional Criteria to Manage Snow to Retain Additional Soil Moisture

Barrier Height. Barriers designed for this purpose shall have a minimum expected height of 1.5 feet during period of expected snow cover.

Barrier Porosity. Barriers established for this purpose shall be designed to achieve a porosity of 60 – 75 percent during periods of expected snow cover.

Barrier Direction and Spacing. The effective spacing shall be measured along the prevailing wind erosion direction during periods of expected snow cover. For uniform distribution of the drifting snow, spacing shall not exceed 12 times the expected height of the barrier.

Additional Criteria to Provide Food and Cover for Wildlife

Vegetation. Barriers are often designed to enhance wildlife habitat in conjunction with one of the other purposes. Select barrier species that are adapted to the site and that meet the intended needs of the targeted wildlife species.

Barrier Width. Barriers established for this purpose shall have a minimum width of two feet.

Barrier Height. Barriers established for this purpose shall have a minimum expected height that provides adequate cover for the targeted wildlife species.

CONSIDERATIONS

Transport of wind-borne sediment and sediment-borne contaminants offsite are reduced by this practice when used in a resource management system.

Herbaceous wind barriers are more suitable than field windbreaks for use under center pivot irrigation systems due to height considerations. Windbreaks may be located outside the windward edge of the circle.

Spacing between barriers may be adjusted, within the limits of the criteria above, to accommodate widths of farm equipment to minimize partial or incomplete passes.

Selection of plants for use in barriers should favor species or varieties tolerant to herbicides used on adjacent crops.

Certain plants may be alternate hosts for pests injurious to adjacent crops and may not be satisfactory for use in barriers. Consider plants that serve as a home for beneficial, pest-eating insects, pollinators and pest predators. Consider planning barriers as trap strips to attract undesirable insects such as virus spreading aphids.

Selection of plant species less palatable to animals may reduce damage to barriers from grazing wildlife.

Where water erosion from melting snow, accumulated within the barrier system, is a concern, supporting erosion control practices such as residue management can reduce the hazard. Where feasible, aligning barriers across the slope can enhance moisture infiltration and reduce erosion.

When barriers are designed to enhance wildlife habitat, plant species diversity should be encouraged. The use of evergreens in barriers designed to provide winter cover may increase their value. Barriers that result in multiple structural levels of vegetation within the barrier will maximize wildlife use.

If the barrier is also designed to provide escape or nesting cover for wildlife, locate barriers where they connect areas of existing perennial vegetation whenever possible and include plants that will have a minimum expected height that provides adequate cover for the targeted species. Barriers that connect areas such as woody draws often provide additional escape and travel cover. Two or more rows are often more effective than one row, with a minimum width of two feet between rows. Stiff stems are important in providing cover during severe winter storms.

Some plants are damaged by blowing wind as well as by wind-borne soil particles. In such cases, the spacing between wind barriers may have to be reduced from that obtained using wind erosion prediction technology.

Encourage the use of adapted native plant materials whenever possible.

Consider using species of plants that sequester more carbon and/or increasing the width of the herbaceous barrier to improve carbon sequestration.

PLANS AND SPECIFICATIONS

Plans and specifications for the establishment and maintenance of this practice shall be prepared for each field or treatment unit according to the Conditions, Criteria, and Operation & Maintenance described in this standard.

Specifications shall be recorded using approved specification sheet 603, job sheets and narrative

statements in the conservation plan, or other acceptable documentation.

OPERATION AND MAINTENANCE

Annual barriers shall be re-established each year by planting at recommended dates, leaving rows standing and maintained throughout the critical period for which the barrier was designed, or leaving standing strips when incorporating a cover crop into the soil.

Gaps in perennial barriers shall be replanted as soon as practical to maintain barrier effectiveness.

After establishment, perennial barriers shall be fertilized at the same time and rate as adjacent field crops, or as needed by the barriers. Weeds shall be controlled with cultivation, mowing, chemicals or other accepted methods.

Harvest of hay or seed from perennial barriers, grazing, or mowing for weed control, shall be managed to allow regrowth to the planned height before periods when wind erosion, crop damage, or drifting snow are expected to occur. Annual barriers may be grazed or harvested after critical periods have passed.

Wind-borne sediment accumulated in barriers shall be removed and distributed over the surface of the field as determined appropriate.

Barriers shall be re-established or relocated as needed.

Barriers composed of perennial vegetation that are designed to enhance wildlife habitat should not be mowed or pruned unless their height or width exceeds that required to achieve the barrier purpose, or they become competitive with the adjoining land use. When mowing is necessary, it shall be done during the non-nesting season.

Prescribed burning to enhance plant vigor may be completed after nesting/resting periods.

TABLE 1. Suitable Plants For Herbaceous Wind Barriers

Plant Species	Seeding Rate Plants/Ac	Seeding Rate Pounds/Ac PLS	Established Plants/10 ft.Row	Minimum Number of Rows For:	
				Erosion Control (40-50% porosity)	Snow Mgt. (60-75% porosity)
Field Corn					
Twin Row (3 ft. apart)	53,000		38	2	2
30" Rows	20,000		11	6	4
	25,000		14	5	3
	30,000		17	4	3
36" Rows	20,000		14	5	4
	25,000		17	4	3
	30,000		21	4	2
Sweet Corn					
Twin Row (3 ft. apart)	56,000		30	2	2
30" Rows	31,000		18	5	4
	36,000		21	5	3
	41,000		24	4	3
36" Rows	31,000		21	5	3
	36,000		25	4	3
	41,000		28	4	2
Popcorn					
Twin Row (36" Spacing)	56,000		30	2	2
30" Rows	13,000		8	15	9
	18,000		10	11	7
	23,000		13	8	6
36" Rows	13,000		9	12	8
	18,000		12	9	6
	23,000		16	7	5

TABLE 1. Suitable Plants For Herbaceous Wind Barriers (Con't)

Plant Species	Seeding Rate Plants/Ac	Seeding Rate Pounds/Ac PLS	Established Plants/10 ft.Row	Minimum Number of Rows for Erosion Control	Minimum Number of Rows for Snow Mgt.
Flax (6" rows)				(40-50% porosity)	(60-75% porosity)
	2,460,000	30	282	3	2
	2,870,000	35	329	3	2
	3,280,000	40	376	2	2
Pearl Millet					
7" Rows		4	46	11	6
		5	57	9	5
		6	68	8	4
30" Rows		4	195	3	2
		5	244	2	1
		6	293	2	1
36" Rows		4	234	2	1
		5	293	2	1
		6	351	2	1
Sorghum					
7" Rows	300,000	20	40	3	2
	375,000	25	50	3	2
	450,000	30	60	2	1
30" Rows	75,000	5	43	3	2
	150,000	10	86	2	1
	225,000	15	129	1	1
36" Rows	75,000	5	52	3	2
	150,000	10	103	1	1
	225,000	15	155	1	1

TABLE 1. Suitable Plants For Herbaceous Wind Barriers (Con't)

Plant Species	Seeding Rate	Seeding Rate	Established	Minimum Number of Rows	
	Plants/Ac	Pounds/Ac PLS	Plants/10 ft.Row	Erosion Control	Snow Mgt.
Sudangrass				(40-50% porosity)	(60-75% porosity)
7" Rows	220,000	4	30	15	9
	275,000	5	37	12	7
	330,000	6	44	10	6
30" Rows	220,000	4	126	4	2
	275,000	5	158	3	2
	330,000	6	189	2	1
Sunflower					
30" Rows	17,000		10	12	8
	22,000		13	19	6
	27,000		16	8	5
36" Rows	17,000		12	10	7
	22,000		15	8	5
	27,000		19	6	4
Tall Wheatgrass					
(6" Rows)		15	136	4	2
		20	181	3	2
		25	227	2	2
Switchgrass					
(6" Rows)		3	134	4	2
		4	179	3	2
		5	223	2	2
Big Bluestem					
(6" Rows)		7	132	4	2
		9	170	3	2
		11	208	2	2